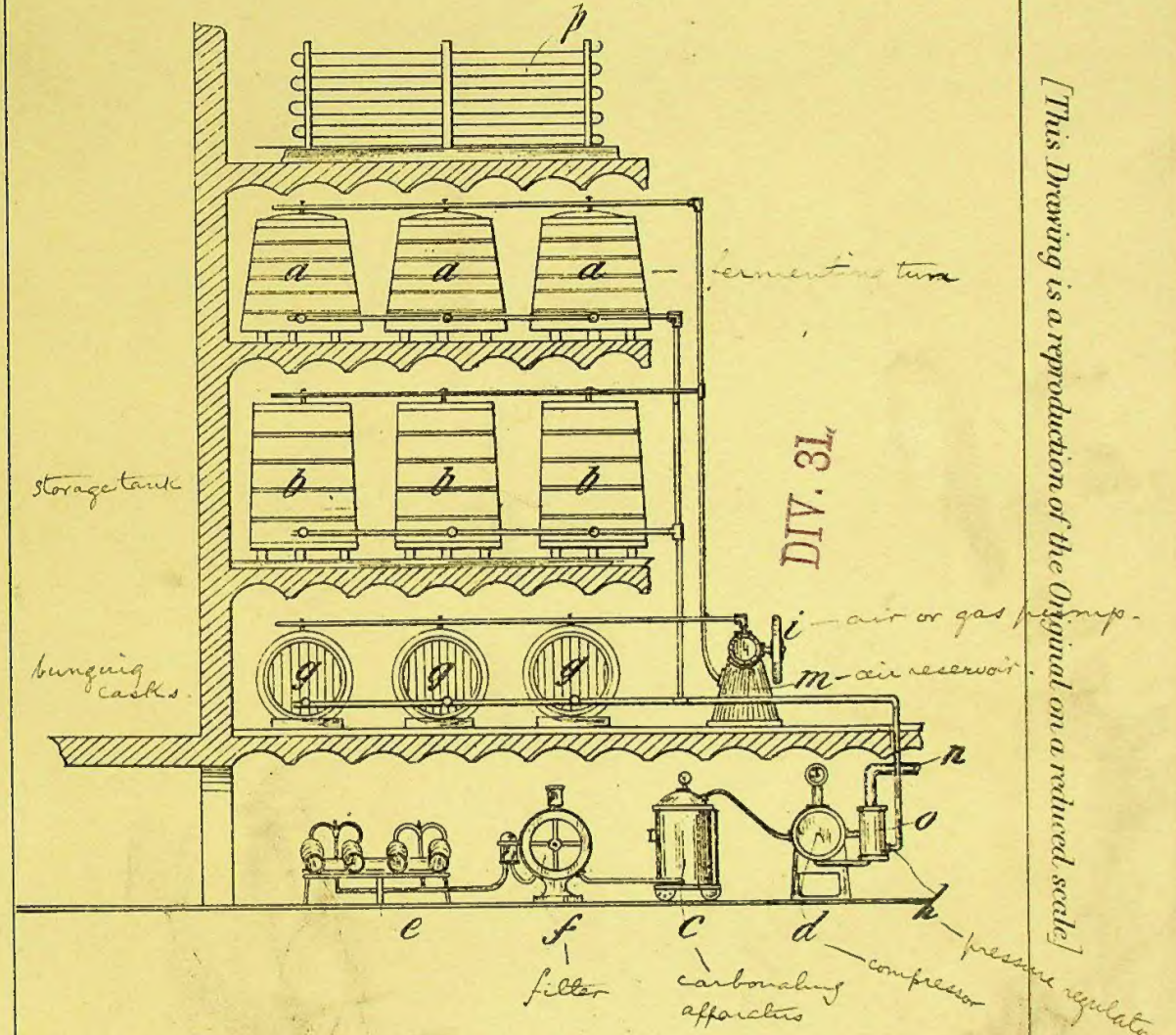
~~100~~ ALCOHOL.
Fermenting-
Processes.

29

Ferments under pressure
- air or CO_2 gas, - maintaining
pressure until the beer
is clarified, racking off under
pressure, impregnating with CO_2
+ finally racking off under
pressure. (Air or CO_2.)



[This Drawing is a reproduction of the Original on a reduced scale]

LONDON: Printed by DARLING and SON Ld.
for Her Majesty's Stationery Office. 1892.

Malby & Sons, Photo-Litho.

lling under pressure. 1892

N° 6531 A.D. 1892

Date of Application, 5th Apr., 1892—Accepted, 3rd Sept., 1892

COMPLETE SPECIFICATION.

An Improved Process of Finishing Beer.

I, JACOB FREDERIC WITTEMANN, Manufacturer, of 188 William Street New York, State of New York, United States of America, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement :—

This invention relates to an improved process of finishing beer in such a manner that beer of high effervescence in other words beer containing a large percentage of carbonic acid gas but of a low degree of attenuation and alcoholic strength is produced.

For producing the required degree of effervescence it was necessary to resort to the well known Kraeuse process by which "young beer" or beer in the first stages of fermentation is introduced into fermented beer so that a secondary fermentation is produced by which an increased percentage of carbonic acid gas is generated but the quality of the beer and especially its property of keeping under varying temperature greatly impaired.

By the Kraeuse process namely the introduction of additional fermenting matter and the following suppression of the resulting quick fermentation both low temperature and the retention in the body of the beer of a large percentage of gas so much uncoverted saccharine matter is retained that the perfectly clear appearance which has been attained by the bunging-pressure is only of temporary duration.

In other words the very object which is aimed at by the previous fermentation of the beer and the perfect conversion of the sugar into alcohol and carbonic gas and the precipitation of the yeast are interfered with to such a degree that the beer is unstable and unfit for shipment except when it can be retained at an uninterrupted low temperature.

Other similar methods such as the introduction of saccharine extracts or carbonates are no less objectionable on account of the resulting bad flavour and indigestible character of the beer so treated.

The introduction of pure carbonic acid gas into fully attenuated and clarified beer so as to produce the desired degree of effervescence has long been recognized as the only practical solution of this problem but the necessary uniform and thorough saturation of the beer in all its parts so as to produce the effervescence equal to that resulting from natural fermentation has not been successfully attained by the methods heretofore in use.

The object of my invention is to furnish an improved process of finishing beer by placing the same under gas or air pressure while in the fermenting tuns or storage casks and maintaining said pressure or increasing the same until the beer attains the desired brilliancy after which it is racked off saturated with carbonic acid gas and then drawn into kegs or other vessels for shipment or otherwise.

The accompanying drawing shows a diagram illustrating one form of apparatus employed for carrying out my improved process of finishing beer in a brewery.

In my process the beer after it has fermented and has rested for some time is transferred into so-called "ruh-casks" or in case of quick beers it is taken directly from the fermenting tuns *a* after it has attained the desired degree of attenuation and is then subjected to an air or gas pressure of from one and one-half to two atmospheres as required by its condition of turbidity or by the elevation or friction that is to be overcome in the racking process. After the beer has settled under this pressure during which finings or absorbent chips or both may be used if desired to hasten the clarification the sediment is first blown off into a proper

[*Price 8d.*]

receptacle through a racking-hose which is connected with discharge opening at the lower part of the cask or other storage vessel *b* at or near its bottom. The racking-hose is next connected with a carbonating apparatus of any approved construction such as *c* so as to obtain the complete saturation of the beer with carbonic acid gas said carbonating apparatus *c* being provided with a regulable supply of gas which is already under pressure or compressed to the necessary degree of pressure in the apparatus as would be the case when a compressor such as *d* is to be used.

The supply of gas has to be continuous and the pressure has to be maintained at a certain uniform degree so as to prevent the carrying along with the saturated beer of more gas than can be absorbed by the same before it reaches the final racking off outlets on the racking-table *e* or before it reaches the filter which has to be used when the precipitation of the yeast-cells in the beer has not been perfect or when the use of a filter is desirable on account of the sediment that arises when the last portion of each storage vessel *b* is racked off.

A filter *f* may also be interposed between the carbonating apparatus *c* and the racking off hose if such should be found necessary.

The carbonated beer is then drawn off continuously from the carbonating apparatus *c* or if a filter *f* be used from the latter directly to the racking table *e* and there filled into the shipping kegs or bottles by the usual method.

While it is advantageous to sustain the original pressure on the beer throughout the entire process the pressure on the beer may be relieved after it leaves the bunging vessels *g* and then subjected again to pressure either by gravity or by a mechanical compressor *d* supplying carbonic acid gas at a corresponding pressure. In thus relieving the pressure on the beer the absorption of air is prevented by discharging the beer into a closed vessel filled with carbonic acid gas so that the air is entirely excluded.

It is advisable to employ separate pressure regulators *h* for the air and gas that is introduced into each storage vessel for the successive purpose of bunging or precipitating the yeast by pressure and the racking off of the beer under pressure through a carbonating apparatus and filter if such be used to the final racking off faucets.

Heretofore a uniform pressure from an air compressor or compressed gas reservoir or from a system of pipes is placed on the several casks irrespective of the varying columns of beer that may be acted upon by the gas pressure.

The result is a discharge under varying pressure causing sometimes too much agitation and sometimes too slow a delivery. In case the fermenting tuns or storage casks cannot stand the required pressure it will be necessary to rack the beer to be treated into stronger vessels and subject it then to the required pressure.

The use of the regulators described makes it feasible to keep a number of casks under any desirable pressure and to increase the pressure of single casks at will from the compressed gas or air supply without the necessity of regulating the compressor should only one such cask be under pressure.

For the same purpose it is also advisable to employ pressure regulators for the flow of beer out of each separate cask or at the inlet to the carbonating apparatus so as to ensure a perfectly uniform pressure in the latter the uniform saturation with gas and the uniform discharge in racking off.

With such regulators the pressure must vary automatically with the decreasing column of liquid in the cask. While it is advantageous to employ such regulators so as to cut off the liquid supply from time to time and maintain a predetermined delivery pressure yet I do not confine myself to such use of the regulators but may also establish a communication between said liquid regulators and the gas supply regulators so as to increase the gas supply with the decreasing pressure at the point of delivery of the liquid.

When the clearness or brilliancy which can be obtained by mechanical filtration alone is sufficient the beer is drawn off without gas or air pressure filtered under

exclusion of air carbonated under pressure and under exclusion of air and then racked off into the distributing vessels.

When the maintenance of a reserve stock of finished beer is desired either one of the above described processes of finishing beer may be employed which is then racked off into storage casks which are previously placed under a corresponding counter pressure of gas or air and from which the gas or air is gradually forced out and replaced by the entering liquor in the well known manner.

i is the air or gas pump.

m is an air reservoir.

n is gas supply.

o is beer supply chamber.

p is beer cooler.

Carbonating apparatus *c* may be any suitable apparatus by which beer is impregnated with carbonic acid gas. The gas is supplied through the pipe *n* and pumped by the compressor into the carbonating apparatus *c* where it is incorporated with the beer under pressure.

f is a pressure filter of any suitable construction by which the yeast cells in the beer are filtered off—and prevented from passing into the distributing vessels—for the purpose of making the beer more durable. A suitable filter used in the United States of America for this purpose is known by the name of the "Stockheim" filter which is doubtlessly also known in Great Britain.

d is an ordinary compressing pump by which the gas and beer is sucked in so as to be forced into the carbonating apparatus *c* for incorporating the carbonic acid into the beer.

o is a beer supply chamber of sufficient size so that the pump *d* can take up the required quantity and mix it with the carbonic acid in the carbonating apparatus *c*. The chamber *o* is supplied with beer from the bunging casks *g* in which it is held under pressure of air or carbonic acid in the usual manner in brewing beer.

The course of the beer from the fermenting tuns *a* to the racking table *e* is as follows :—

After the fermentation is completed it is first drawn off into the storage cask *b* which operation is accomplished by the pipes connected with the bottom of the fermenting tuns *a* and the bottom of the storage casks *b*. The top part of the fermenting tuns *a* and storage casks *b* is supplied by carbonic acid gas under pressure so that the fermented liquid is readily dropped from the series of fermenting tuns *a* into the storage casks *b* and from the latter into the bunging casks *g* which are likewise kept under pressure of air or carbonic acid gas. From the bunging casks *g* the beer is drawn off to the beer supply chamber *o* which is also connected with a supply of carbonic acid gas and pumped from the same by the compressor *d* into the carbonating apparatus *c* for impregnation with the carbonic acid gas. It passes then from the carbonating apparatus *c* to the filter *f* and then to the racking table *e* where it is drawn off into the distributing kegs or other vessels.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is :—

1. The process of finishing beer taken directly from the fermenting tuns or storage casks which consists in subjecting the beer contained in said vessels to gas or air pressure secondly maintaining or increasing the pressure until the beer is clarified to the required degree then racking off under pressure next impregnating the same with carbonic acid gas and finally racking it off under pressure into the distributing vessels substantially as set forth.

2. The process herein described of finishing beer taken directly from the fermenting tuns or storage casks which consists in racking it off into bunging vessels subjecting it to gas or air pressure therein until clarified impregnating the same with carbonic acid gas and racking it off under pressure into the distributing vessels substantially as set forth.

3. The process herein described of finishing beer which consists in filtering the same under exclusion of air impregnating it with carbonic acid gas and then racking it off under pressure substantially as set forth.

4. The method herein described of finishing beer which consists in subjecting the beer to pressure in the fermenting tuns or storage casks regulating the pressure at the point of delivery of the liquid from said vessels then impregnating it with carbonic acid gas and lastly racking it off under pressure substantially as set forth.

5. The process herein described of finishing beer by subjecting the beer while in the fermenting tuns or storage casks to a pressure and regulating said pressure for each individual vessel separately then filtering the liquor impregnating the same with carbonic acid gas and finally racking it off under regulated pressure substantially as set forth.

Dated this 5th day of April 1892.

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Agents for the Applicant.

London: Printed for Her Majesty's Stationery Office, by Darling & Son, Ltd.—1892